In-Service Aircraft Engine System Life Monitor Using Advanced Life-Estimating Technique, Phase I

Completed Technology Project (2007 - 2007)

Project Introduction

It is proposed to develop an accurate in-service aircraft engine life monitor system for the prediction of remaining component and system life for aircraft engines. Once proven in the aircraft engine environment, this life monitoring system will be used in a wide variety of airborne and land-based air-breathing engine systems. The aircraft engine life monitoring system will include three separate algorithms: an in-flight service monitoring algorithm, a pre-flight and post flight engine analysis algorithm, and a component-life tallying algorithm. The in-flight service monitor will treat the engine as a whole in response to sampling data of torque, speed, temperature and time. The engine analysis algorithm will determine the engines' operation parameters from those of its components. It also will determine the life and reliability of individual components based on the service monitoring algorithm's output. The component-life algorithm will accumulate life and reliability tables. The Phase I effort will develop the life-monitoring and supporting life-estimation and reliability algorithms. In Phase II effort, the full life-estimating system will be specifically tailored, assembled and tested with a commercial aircraft engine.

Anticipated Benefits

The cost-effective, reliable use of expansive aerospace and land-based air-breathing engine systems can be extended with more accurate knowledge of the remaining component and system fatigue life. By improving the in-service life estimation associated with these devices, longer reliable service life can be obtained. The high cost associated with surprise failures and unscheduled emergency maintenance procedures can be reduced substantially with the use of an in-service life monitor such as one proposed herein. The work is in support of NASA's aircraft long-range goals. It impacts every aspect of safety and integrated resilient aircraft control. The successful completion of this project can improve aviation safety, reliability, and mitigation of failure. It will affect cost-effective design and manufacturing for new production engines and can reduce life cycle and maintenance costs.

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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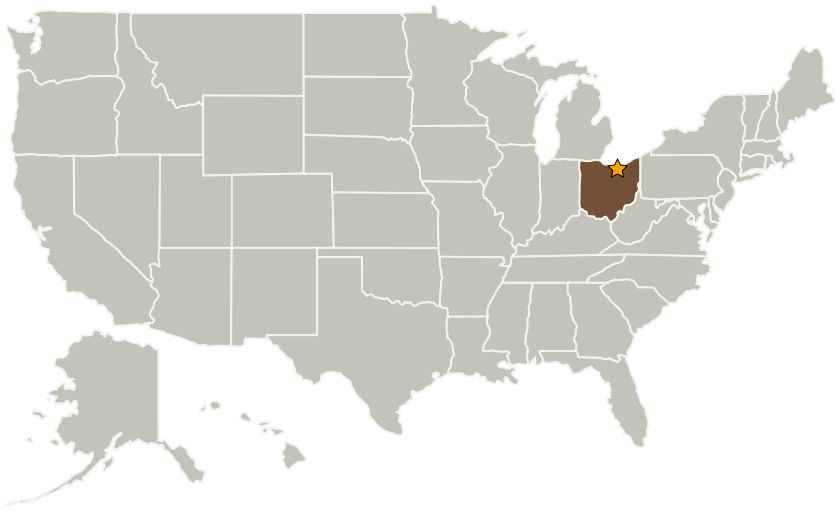
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Nastec, Inc.	Supporting Organization	Industry	Brook Park, Ohio

Primary U.S. Work Locations
Ohio

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Project Manager:
Erwin V Zaretsky

Principal Investigator:
Richard Klein

Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
  - TX13.2 Test and Qualification
    - TX13.2.6 Advanced Life-Cycle Testing Techniques